VARIABLY CONFIGURED EXERCISE DEVICE

Background

[0001] The present application relates to a variable configuration exercise device. In particular, the present application relates to a variable configuration exercise device that can be adjusted to change the orientation of a support surface (e.g., height, inclination, etc.) and/or the resistance provided for by the exercise device.

[0002] In some exercise devices, the exerciser can sit or lie on a seat or other support platform (e.g., a bench) and, from this position, the exerciser can perform a series of exercise routine depending on the type of exercise device that the exerciser is using. Currently, support platforms can be adjusted by the exerciser, for example in height, so that the inclination of the support platform can be changed to suit the exerciser. Depending on the exercise device, the adjustment of the inclination can also change the resistance felt by the exerciser when performing certain exercise routines. Generally, this adjustment is a manual one and must be carried out each time in accordance with a change of exercise or for a different user.

[0003] In such exercise devices, orientation adjustment and/or resistance adjustment can be accomplished through manual means through the use of removable locking devices such as locking pins. The locking pins are configured to retain the support platform in a fixed orientation when engaged, yet permit the exerciser to remove the pin and fix the support platform in another orientation. Since adjustment is manual, the exerciser typically has to dismount the exercise device to adjust the orientation and/or resistance.

Brief Description Of The Drawings

[0004] It will be appreciated that the illustrated boundaries of elements (e.g., boxes or groups of boxes) in the figures represent one example of the boundaries. One of ordinary skill in the art will appreciate that one element may be designed as multiple elements or that multiple elements

may be designed as one element. An element shown as an internal component of another element may be implemented as an external component and vice versa.

[0005] Further, in the accompanying drawings and description that follow, like parts are indicated throughout the drawings and description with the same reference numerals, respectively. The figures are not drawn to scale and the proportions of certain parts have been exaggerated for convenience of illustration.

[0006] Figure 1 is a perspective view of one embodiment of a variably configured exercise device 100;

[0007] Figure 2 is a side elevation view of the variably configured exercise device 100;

[0008] Figure 3 is a perspective, exploded view of one embodiment of an actuation mechanism 300; and

[0009] Figure 4 illustrates a cross-sectional view of one embodiment of the actuation mechanism 300.

Detailed Description

[0010] The present application is directed to exercise devices that include one or more support surfaces that can be adjusted to control one or more operating parameters of the exercise device, such as resistance, inclination or other similar operating parameters. While the present application will be described in the context of a multi-function exercise device such as the Total Gym®, it should be understood that the present application is not limited to any particular type of exercise device. To the contrary, the actuation mechanism described herein can be readily adapted to any exercise device to adjust the orientation of the one or more support surfaces to control an operating parameter of the device such as resistance. As used herein, the term "exercise device" shall refer broadly to any type of exercise machine, including, but not limited to, incline sit-up devices, weight benches, lateral sliding exercise devices, treadmills, exercise cycles, Nordic-style ski exercise devices, rowers, steppers, elliptical or striding exercise devices.

[0011] Figures 1 and 2 illustrate a perspective view and a side elevation view of one embodiment of an exercise device 100, respectively. The exercise device 100 can include an upright support post or vertical support member 105 and guide or sliding member 110. The sliding member 110 can be configured to be selectively moved along the vertical support member 105 in a direction, represented by arrows A, substantially parallel to the vertical support member 105. In one embodiment, the sliding member 110 can be configured to receive the vertical support member 105 and permit the sliding member 110 to slide freely upwardly and downwardly along the vertical support member 105. Alternatively, the sliding member 110 can be configured to be received by the vertical support member 105 for relatively smooth sliding motion. Optionally, to reduce friction between the sliding member and the vertical support member 105, bushings (not shown) may be provided.

[0012] In one embodiment, the exercise device 100 can be configured to be collapsible such that it can be folded for relatively easy storage as shown and described in U.S. Patent No. 5,967,955, which is hereby incorporated by reference in its entirety herein. In such an embodiment, the exercise device 100 can include a pair of inner rails 115. Each inner rail 115 has a first end portion 116 pivotally connected to the sliding member 110, and a second end portion 118 pivotally connected to a first end portion 119 of an outer set of rails 120 at a rail pivot point 125. Obviously, the exercise device 100 can be configured such that the inner and outer rails are reversed where the first end portion 119 of each outer rail 120 is pivotally connected to the sliding member 110.

[0013] To provide support for the inner and outer sets of rails 115, 120 and to provide collapsible support for the rails 115, 120, a strut 130 can be provided. The strut 130 has a first end portion 132 that can be pivotally connected to a lower portion of the vertical support member 110 and a second end portion 134 that can be pivotally connected to the rail pivot point 125. Optionally, the second end portion 134 of the strut 130 may be pivotally connected to the rail pivot point 125, while the first end portion 132 can rest on a support surface 135 such as a floor or other support platform.

[0014] In an alternate embodiment and when collapsibility may not be desired, the exercise device 100 can include a single pair of rails (not shown) as opposed to two pairs of rails (i.e., the

inner and outer pairs of rails 115, 120). In this embodiment, the first end of the single pair of rails can be pivotally connected to the sliding member 110. Also, depending on the design, a strut may or may not be provided. It will be appreciated that in either the collapsible or non-collapsible embodiments, a single rail may be used in place of a pair of rails.

[0015] With continued reference to Figure 1, the exercise device 100 can further include a user support platform or glide board 140 having rollers (not shown) provided on a bottom side thereof. The rollers on the user support platform 140 can be configured to engage and roll along the inner and outer pair of rails 115, 120. To prevent the user support platform 140 from rolling too far down the outer rails 120, a bumper 145 can be positioned on at least one of the outer rails 120.

[0016] In one embodiment, the sliding member 110 can include pulley support bars 150 extending from opposite sides thereof. The pulley support bars 150 can, for example, be L-shaped and extend out from the sliding member 110 in a direction substantially perpendicular to the direction of sliding A of the sliding member 110. To prevent interference between the pivotal movement of the inner rails 115 relative to the sliding member 110, the pulley support bars 150 can extend outward from the sliding member 110 beyond the outer edge of the inner rails 115. Attached to the pulley support bars 150 are pulleys 155.

[0017] The exercise device 100 can further include a connector extending through the pulleys 155 and connecting to the user support platform 140. The connector may be of any suitable well-known type, but shown by way of example in Figure 1 is a cable 160. The cable 160 can include handles 165 at each end. In one embodiment, the cable 160 can extend through the two pulleys 155 positioned on the pulley support bars 150 and loop through a third pulley (not shown) attached to the user support platform 140 along the lateral centerline of the user support platform 140. This position allows for unilateral (i.e. one arm), bilateral (i.e., two arm) and static equilibrium (i.e. holding the user support platform 140 suspended by keeping a constant force on each handle 165) use. The cable 160 should be of sufficient length to extend through the pulleys 155 and allow the exerciser to grasp one or both of the handles 165 while the exerciser is on the user support platform 140 and the user support platform 140 is at rest.

[0018] In an alternate embodiment, the connector may be two separate cables extending through the pulleys 155 with each cable fixedly attached to the user support platform 140.

[0019] In one embodiment, the exercise device 100 may further include a footrest 170 provided at a second end 172 of the outer set of rails 120. For example, the footrest 170 can include a pressure plate 175 attached to support bars 180 that are coupled to the second end 172 of the outer set of rails 120 by a cross member 185. When that exercise device 100 is in an unfolded state, the footrest 170 can be, for example, positioned substantially perpendicular to the second end 172 of the outer set of rails 120. In one embodiment, the footrest 170 is removable; however it will be appreciated that the footrest 170 can be permanently attached to the outer rails 120.

[0020] As stated above, the sliding member 110 can be selectively moved along the vertical support member 105. The sliding member 110 can be at least partially supported by and incrementally moveable along the vertical support member 105 via an actuation mechanism (not shown). In one embodiment, the actuation mechanism can adjust the position of the sliding member 110 along the vertical support member 105 in a linear direction A, which is substantially parallel to the vertical support member 105. The vertical adjustment of the sliding member 110, in turn, can vary the inclination of the user support platform 140 relative to the floor. As used herein, an actuation mechanism refers to a powered mechanism for changing the position of elements of the exercise device to adjust orientation of a support surface of the exercise device and/or the resistance of the exercise device to movement induced by the user.

[0021] By varying the position of the sliding member 110 along the vertical support member 105, the angle θ between the rails 115, 120 and the floor 135 (illustrated in Figure 2) may be adjusted. The adjustment of this angle alters the percentage of the exerciser's weight that the exerciser's muscles are moving (i.e., resistance). This allows for adjustment of the intensity of the exerciser's workout. At the lowest level, the exerciser's muscles can be moving 5% of the exerciser's body weight; at the highest level the exerciser's muscles can be moving 60%. Weight bars (not shown) may be added to the user support platform 140 so that weight plates (not shown) may be positioned on the weight bars, thus adding to the weight propelled by the exerciser's muscles.

[0022] Figure 3 illustrates an exploded perspective view of one embodiment of an actuation mechanism. One suitable example of an actuation mechanism is a leadscrew assembly 300. The leadscrew assembly 300 can include a drive motor 305 coupled to a leadscrew 310. In one embodiment, the drive motor 305 can be coupled to the leadscrew 310 via a gear box 315. In an alternate embodiment, the leadscrew 310 can be directly coupled to the shaft of the drive motor 305 by any suitable coupling. The drive motor 305 can be, for example, a bi-directional motor configured to be selectively rotated in a clockwise or counterclockwise direction which, as described further below, will cause the sliding member 110 to raise or lower with respect to the vertical support member 105. However, it will be appreciated that other types of motors can be used such as AC motors, DC motors, and stepper motors.

[0023] It will be appreciated that other suitable electromechanical actuation mechanisms can be used instead of leadscrew assemblies such as belt driven linear actuators, linear slides, rack and pinion assemblies, and linear servomotors. It will also be appreciated that other types of actuation mechanisms can be used such as slides that are powered hydraulically, pneumatically, or electromagnetically.

[0024] In one embodiment, the leadscrew 310 can include an external thread profile. The external thread profile can be, for example, an ACME thread profile. The leadscrew 310 can be any desired length depending on the range of motion required for any exercise device.

[0025] The leadscrew assembly 300 can include mounting brackets 320 at each end of the leadscrew 310 for mounting the leadscrew assembly 300 to the vertical support member 105. To support the leadscrew 310 and to ensure smooth rotational motion of the leadscrew 310, thrust bearings 325 can be provided in each mounting bracket 320. To house and protect the leadscrew assembly 300, a shroud 330 is mounted to the vertical support member 105.

[0026] Figure 4 illustrates a cross-sectional side view of one embodiment of the leadscrew assembly 300. To convert the rotary input motion of the motor 305 and leadscrew 310 to linear output motion to selectively raise and lower the sliding member 110 along the vertical support member 105, a driving element or threaded driven member 405 can be threadedly engaged with the leadscrew 310 and attached to the sliding member 110 by a mounting bracket 410. In one

embodiment, the driving element 405 can be a leadscrew nut. The driving element 405 can have an internal thread profile that matches the external thread profile of the leadscrew 310 to ensure mating rotational contact between the driving element 405 and the leadscrew 310. In general, as the leadscrew 310 is rotated, the driving element 405 will move in a linear direction A along the leadscrew 310. Since the leadscrew nut 405 is attached to the sliding member 110, the sliding member 110 can be raised or lowered relative to the vertical support member 105.

[0027] In an alternate embodiment, the actuation mechanism can directly support and incrementally adjust the position of the first end 116 of the first pair of rails 115 along the vertical support member 105 without the need for a sliding member 110. In yet another alternate embodiment, the actuation mechanism can replace both the vertical support member 105 and the sliding member 110 by exclusively supporting the rails and being configured to raise and lower the first end 120 of the first set of rails 115.

[0028] To control the movement of the actuation mechanism 300 and change the vertical position of the sliding member 110, a controller or processor (not shown) can be provided. The controller (not shown) can be configured to communicate and control the motor 305 that is coupled to the actuation mechanism 300. For example, the controller (not shown) can control the speed and rotational direction of the motor 305. It will be appreciated that the controller can be a valve when the actuation mechanism is powered pneumatically or hydraulically.

[0029] In one embodiment, the initiation of a change in vertical position of the sliding member 110 can be activated by a control signal generated by an input device (not shown). Suitable input devices can include transducers, sensors and switches. Sensors and transducers can convert physical data such as speed, position, temperature, acceleration and pressure into electrical signals that are recognized by the controller. Switches can be configured to permit the operator to initiate, halt, or modify action in the controlled system, including turning electric, electromagnetic, pneumatic, and hydraulic devices on and off.

[0030] In one embodiment, an input device can be provided on the vertical support column 105 to permit the exerciser to adjust the position of the sliding member 110 relative to the vertical support column 105. In this embodiment, the input device can take the form of a "up"

and "down" switch that is electrically connected to the controller and is configured to permit the exerciser to independently control the movements of the sliding member 110.

[0031] In another embodiment, an input device can be provided on at least one of the handles 165 to permit the exerciser to adjust the position of the sliding member 110 relative to the vertical support column 105 while performing an exercise routine. In this embodiment, the input device can take the form of a switch having a wireless emitter that is configured to transmit a control signal to a wireless receiver in the controller. The input device can be connected to the controller through different kinds of wireless transmission means (e.g., radio frequency (RF), infrared (IR), bluetooth (see www.bluetooth.org/spec/ for information on the Bluetooth Specification), or any other recognized wireless transmission protocol. Other types of suitable transmission means can include satellite, modem, cable modem, DSL, ADSL connection, ISDN, Ethernet, or other similar connections, voice activated, and the like.

[0032] In yet another embodiment, an input device can take the form of a remote control configured to permit the exerciser or a trainer to adjust the inclination of the user support platform 140. In this embodiment, the remote control can include a wireless emitter that is configured to transmit a control signal to a wireless receiver in the controller.

[0033] In yet another embodiment, an input device may be provided at both ends of the leadscrew 310 to provide the controller with "out of bounds" information. For example, the input device may take the form of an optical switch that is configured to terminate power to the motor 305 upon activation of one of the optical switches. Other suitable input devices that can be used instead of optical switches include mechanical switches that are activated by physical contact, hall effect switches that are activated by magnetic properties, and inductive proximity switches.

[0034] In use, the exerciser can position himself or herself on the user support platform 140 in the supine position and grasp one or both of the handles 165. The exerciser can then draw one or both of the handles 165 toward the exerciser and, by doing so, transports the user support platform 140 up along the inner and outer rails 115, 120. An exerciser may also vary the resistance while working upper body muscles by positioning himself or herself on the user

support platform 140 with the exerciser's feet on the floor. The legs and lower body then provide assistance in moving the user support platform 140 lessening the load on the upper body muscles.

[0035] In an alternate embodiment, the exerciser may position him or herself on the user support platform 140 with the exerciser's feet positioned on the footrest 170. The exerciser may then extend the exerciser's legs to move the user support platform 140 up along the rails 115, 120.

[0036] To selectively adjust the inclination of the user support platform 140 and/or vary the resistance before the exerciser positions himself or herself on the user support platform 140, the exerciser can activate the "up/down" switch located on the vertical support member 110 or remote control. By pressing the "up" button on the switch, the inclination of the user support platform 140 can be incrementally increased (i.e., the angle θ is increased). On the other hand, by pressing the "down" button on the switch, the inclination of the user support platform 140 can be incrementally decreased (i.e., the angle θ is decreased).

[0037] To selectively adjust the inclination of the user support platform 140 and/or vary the resistance while the exerciser is positioned on the user support platform 140, the exerciser can activate the "up/down" switch located on one of the handles 165. By pressing the "up" button on the switch, the inclination of the user support platform 140 can be incrementally increased. On the other hand, by pressing the "down" button on the switch, the inclination of the user support platform 140 can be incrementally decreased.

[0038] If the exerciser is working with a trainer/instructor, the trainer/instructor can observe the exerciser and control the exerciser's device from a remote location. For example, the trainer/instructor can use the remote control to selectively adjust the inclination of the user support platform 140 and/or vary the resistance while the exerciser is positioned on the user support platform 140. This feature can permit the trainer/instructor to control multiple exercise devices when used in a classroom or group setting.

[0039] While the present invention has been illustrated by the description of embodiments thereof, and while the embodiments have been described in considerable detail, it is not the intention of the applicants to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications will readily appear to those skilled in the art. Therefore, the invention, in its broader aspects, is not limited to the specific details, the representative apparatus, and illustrative examples shown and described. Accordingly, departures may be made from such details without departing from the spirit or scope of the applicant's general inventive concept.